

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method comprising:

initiating a power increase for a potentially needed functional unit to an operable power level, if the potentially needed functional unit has a present power level that is lower than the operable power level when a use counter corresponding to the potentially needed functional unit contains a value other than a predetermined value;~~wherein the potentially needed functional unit is identified based on a determination of whether the potentially needed functional unit is operable to execute at least one software instruction stored within an instruction cache;~~

fetching a line of one or more software instructions into ~~the~~an instruction cache;

generating an information vector for the line before or as the line is fetched into the instruction cache, wherein the information vector identifies a set of functional units that are operable to execute the one or more software instructions;~~and~~

identifying the potentially needed functional unit based on the information ~~vector;~~vector.

adjusting the use counter for a corresponding functional unit when the functional unit is either identified as potentially needed or when a software instruction, having a corresponding information vector identifying the corresponding functional unit as potentially needed, is eliminated from the instruction cache.

2. (Original) The method of claim 1, further comprising:

fetching one or more software instructions into the instruction cache.

3. (Original) The method of claim 2, wherein fetching the one or more instructions

comprises fetching the one or more instructions into a conventional cache.

4. (Original) The method of claim 2, wherein fetching the one or more instructions comprises fetching the one or more instructions into a trace cache.

5. (Cancelled).

6. (Original) The method of claim 1, further comprising:
indicating power status information for a set of functional units, wherein the power status information indicates whether a functional unit, within the set of functional units, has a present power level that places the functional unit in an operable power state or a low power state.

7. (Currently Amended) The method of claim 1, further comprising:
incrementing ~~a~~the use counter for a functional unit when a software instruction is fetched into the instruction cache, and when the functional unit ~~is~~should be operable to execute at least part of the software instruction.

8. (Original) The method of claim 7, further comprising:
decrementing the use counter for the functional unit when the software instruction is eliminated from the instruction cache.

9. (Currently Amended) The method of claim 1, further comprising:
selecting one or more selected lines of software instructions stored within the cache; and
identifying the potentially needed functional unit as a functional unit that ~~is~~should be operable to execute at least one software instruction stored within the one or more selected lines.

10. (Original) The method of claim 1, further comprising:

activating a line of software instructions stored within the cache; and
identifying the potentially needed functional unit as a functional unit that is operable to execute at least one software instruction stored within the line.

11. (Original) The method of claim 1, further comprising:

identifying an unneeded functional unit as a functional unit that is not operable to execute the at least one software instruction; and

initiating a power decrease for the unneeded functional unit, if the unneeded functional unit has a second present power level that is greater than or equal to a second operable power level.

12. (Original) The method of claim 1, wherein initiating the power decrease comprises:

initiating the power decrease for the unneeded functional unit after execution is complete of any in-flight instructions that use the unneeded functional unit.

13. (Original) The method of claim 1, wherein initiating the power increase comprises:

initiating the power increase for a functional unit selected from a group of functional units that includes one or more floating-point units, multipliers, dividers, shifters, digital signal processors, co-processors, application specific integrated circuits, data processing engines, debug logic blocks, encryption units and key-generation units.

14. (Original) The method of claim 1, wherein initiating the power increase comprises:

determining a selected operable power level from one of multiple operable power levels, wherein the selected operable power level is selected based on an expected result latency; and

initiating the power increase to the selected operable power level.

15. (Currently Amended) A method comprising:

fetching one or more lines of software instructions into an instruction cache, which is accessible to a processing engine;

generating and storing an information vector for selected ones of the one or more lines before or as the one or more lines are fetched into the instruction cache, wherein the information vector identifies a set of functional units that ~~are~~ should be operable to execute software instructions within a line;

identifying potentially needed functional units based on the information vector, wherein a functional unit includes a portion of hardware, which is operable to perform a function in response to special instructions received from the processing engine;

adjusting a use counter corresponding to an identified potentially needed functional unit;

identifying unneeded functional units, based on use counters that contain a predetermined value, as functional units that are not required to be operable to execute a software instruction stored within the instruction cache;

initiating a power increase for selected ones of the potentially needed functional units that are in a low power state; and

initiating a power decrease for selected ones of the unneeded functional units that are in an operable power state.

16. (Cancelled).

17. (Original) The method of claim 15, wherein fetching the one or more instructions comprises fetching the one or more instructions into a conventional cache.

18. (Original) The method of claim 15, wherein fetching the one or more instructions comprises fetching the one or more instructions into a trace cache.

19. (Original) The method of claim 15, wherein initiating the power increase comprises:

initiating the power increase for a functional unit selected from a group of functional units that includes one or more floating-point units, multipliers, dividers, shifters, digital signal processors, co-processors, application specific integrated circuits, data processing engines, debug logic blocks, encryption units and key-generation units.

20. (Original) The method of claim 15, wherein initiating the power increase comprises:

determining a selected operable power level from one of multiple operable power levels, wherein the selected operable power level is selected based on an expected result latency; and

initiating the power increase to the selected operable power level.

21. (Currently Amended) A computer-readable medium having program instructions stored thereon to perform a method, which when executed within an electronic system, results in:

identifying a potentially needed functional unit as a functional unit that ~~is~~should
be operable to execute at least one software instruction stored within an instruction cache;

fetching a line of one or more software instructions into the instruction cache;

generating and storing an information vector for the line before or as the line is fetched into the instruction cache, wherein the information vector identifies a set of functional units that ~~are~~ should be operable to execute the one or more software instructions and wherein identifying the potentially needed functional unit is performed based on the information vector; and

adjusting a use counter corresponding to a functional unit when the functional unit is identified as potentially needed; and

initiating a power increase for the ~~potentially needed~~ functional unit if the use counter for the functional unit contains a value not equal to a predetermined value and, if the potentially needed functional unit has a present power level that is lower than an operable power level.

22. (Cancelled).

23. (Currently Amended) The computer-readable medium of claim 21, wherein executing the program instructions further results in:

selecting one or more selected lines of software instructions stored within the cache; and

wherein identifying the potentially needed functional unit includes identifying the potentially needed functional unit as a functional unit that ~~is~~ should be operable to execute at least one software instruction stored within the one or more selected lines.

24. (Currently Amended) The computer-readable medium of claim 21, wherein executing the program instructions further results in:

identifying an unneeded functional unit as a functional unit that is not required to be operable to execute the at least one software instruction; and

initiating a power decrease for the unneeded functional unit, if the unneeded functional unit has a second present power level that is greater than or equal to a second operable power level.

25. (Original) The computer-readable medium of claim 21, wherein initiating the power increase comprises:

initiating the power increase for a functional unit selected from a group of functional units that includes one or more floating-point units, multipliers, dividers, shifters, digital signal processors, co-processors, application specific integrated circuits, data processing engines, debug logic blocks, encryption units and key-generation units.

26. (Currently Amended) An apparatus comprising:

one or more functional units;

an instruction cache;

a processing engine, which is operable to access software instructions stored within the instruction cache, and send one or more special instructions to the one or more functional units in order to execute at least some of the software instructions;

a predecoder that is configured to evaluate selected ones of the software instructions, before or as line is fetched into the instruction cache, ~~and to determine which~~ functional units will be needed to execute an instruction, and to adjust a use counter corresponding to each functional unit that will be needed to execute an instruction; and

one or more power controllers, which are operable to control whether or not an operable power level or a low power level is provided to selected ones of the one or more functional units, based on whether or not the use counters of selected ones of the one or more functional units contain values not equal to predetermined values, ~~are operable to execute at least~~

~~one software instruction stored within the instruction cache.~~

27. (Original) The apparatus of claim 26, wherein at least one of the one or more functional units includes an internal functional unit, which is located on a same chip as the processing engine.

28. (Original) The apparatus of claim 26, wherein at least one of the one or more functional units includes an external functional unit, which is not located on a same chip as the processing engine.

29. (Original) The apparatus of claim 26, wherein the instruction cache includes a conventional cache.

30. (Original) The apparatus of claim 26, wherein the instruction cache includes a trace cache.

31. (Original) The apparatus of claim 26, wherein the instruction cache comprises:
an array of storage locations; and
a mechanism to sequentially access the storage locations within the array using an enable signal, which has a value that results from shifting information within one or more shift registers.

32. (Original) The apparatus of claim 31, wherein the mechanism to sequentially access the storage locations includes a plurality of first latches, within which a first portion of the enable signal is stored, and wherein the first portion of the enable signal is used to activate a selected word line within the array.

33. (Original) The apparatus of claim 32, wherein the mechanism to sequentially access the storage locations includes a plurality of second latches, within which a second portion of the enable signal is stored, wherein the second portion of the enable signal is used to select a

portion of the selected word line.

34. (Cancelled).

35. (Original) The apparatus of claim 26, further comprising:

a battery interface, operable to provide power to the one or more functional units.

36. (Original) The apparatus of claim 26, further comprising:

a wireless medium interface, operable to enable signals to be sent to and received over a wireless medium.

37. (Original) The apparatus of claim 26, further comprising:

a network interface, operable to enable signals to be sent to and received from a network.

38. (Original) The apparatus of claim 26, wherein the one or more functional units comprise:

one or more functional units selected from a group of functional units that includes one or more floating-point units, multipliers, dividers, shifters, digital signal processors, co-processors, application specific integrated circuits, data processing engines, debug logic blocks, encryption units and key-generation units.

39. (Currently Amended) An apparatus comprising:

one or more functional units;

an instruction cache, which includes

an array of storage locations, and

a mechanism to sequentially access the storage locations within the array using an enable signal, which has a value that results from shifting information within one or more shift registers; and

a processing engine, which is operable to access software instructions stored within the instruction cache, identify at least one functional unit from the one or more functional units based on a determination of whether a use counter corresponding to the one or more functional units contains a value not equal to a predetermined value, ~~is operable to execute at least one software instruction stored within an instruction cache~~, and send one or more special instructions to the at least one functional unit in order to execute at least one of the software instructions;

a predecoder that is configured to evaluate software instructions, before or as the instruction is fetched into the instruction cache, ~~and to determine which functional units will be needed to execute at least one of the software instruction~~, and to adjust the use counter for each determined functional unit.

40. (Original) The apparatus of claim 39, wherein the mechanism to sequentially access the storage locations includes a plurality of first latches, within which a first portion of the enable signal is stored, and wherein the first portion of the enable signal is used to activate a selected word line within the array.

41. (Original) The apparatus of claim 40, wherein the mechanism to sequentially access the storage locations includes a plurality of second latches, within which a second portion of the enable signal is stored, wherein the second portion of the enable signal is used to select a portion of the selected word line.

42. (Original) The apparatus of claim 39, further comprising:
one or more power controllers, which are operable to control whether or not an operable power level or a low power level is provided to selected ones of the one or more

functional units, based on whether or not selected ones of the one or more functional units are operable to execute at least one software instruction stored within the instruction cache.